* NOTICES *

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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] This invention relates to the display panel and its actuation approach of the active-matrix mold using spontaneous light type light emitting devices, such as organic and an inorganic electroluminescence (it is hereafter described as "EL") component, and a light emitting diode (it is hereafter described as "LED") component.
[0002]
[Description of the Prior Art] Conventionally, the display which combines a spontaneous light [, such as organic and an inorganic EL element, or an LED component,] type light emitting device in the shape of an array, and displays by the dot matrix is widely used for television, a personal digital assistant, etc. Unlike a liquid crystal display, the display using a these spontaneous light type light emitting device does not need the back light for lighting, but has the description that an angle of visibility is large, and attracts attention.
[0003] As compared with the display of the passive-matrix mold which performs dynamic actuation, the display called the active-matrix mold which performs static actuation especially combining switching elements, such as a transistor, and these light emitting devices has predominance, such as high brightness, high contrast, and a high definition, and attracts attention in recent years.
[0004] As a conventional example of this kind of display, it is Society to drawing 3 R> 3. for Information The 1-pixel configuration of the actuation circuit of the active-matrix mold display which used the EL element quoted from the page [216-219th] announcement of the collection "Eurodisplay'90" of the 1990 autumn convention drafts to Display issuance is shown. the inside of drawing, and 101 and 107 -- a transistor and 102 -- for a capacitor and 105, as for an EL element and 108, a power-source line and 106 are [the scanning line and 103 / the data line and 104 / a common electrode and 109] current control circuits.
[0005] In the configuration of drawing 3 , if the scanning line 102 is chosen and a selection signal is impressed, a transistor 101 will serve as ON and a data signal will be written in a capacitor 104 from the data line 103 through a transistor 101. The data signal written in the capacitor 104 determines the gate source inter-electrode electrical potential difference of a transistor 107.
[0006] Subsequently, if the scanning line 102 concerned is un-choosing and a transistor 101 turns off, the electrical potential difference between the ends of a capacitor 104 will be held until the scanning line 102 concerned is chosen by the next scan. And according to the electrical potential difference between the ends of a capacitor 104, a current flows in accordance with the path of the drain -> common electrode 108 of the power-source line 105 -> EL element 106 -> transistor 107, and EL element 106 emits light according to this current.
[0007] Generally, in order to perform animation displays, such as a terminal of a computer, a monitor of a personal computer, and television, it is desirable that the gradation display from which the brightness of each pixel changes can be performed. In order to take out gradation nature to an image, the analog gradation method, the area gradation method, and the time amount gradation method were used

conventionally.
[0008] The gate electrode potential of the transistor which supplies a current is controlled by the analog gradation method according to a video signal to a light emitting device. That is, it is necessary to control the conductor of a transistor. In this case, it is necessary to change a video signal according to the brightness-voltage characteristic of a light emitting device. Generally, in order to show nonlinear diode characteristics, as for the voltage-current property of an EL element or an LED component, an electrical-potential-difference-brightness property also shows diode characteristics. Therefore, it is necessary to perform a gamma correction to a video signal electrical potential difference, and a system becomes complicated. Moreover, since a transistor, especially the thin film transistor (it is hereafter described as "TFT") widely used on a display have variation in a property, even if its video signal electrical potential difference inputted into a pixel is uniform, it will produce nonuniformity in a display.
[0009] In the actuation circuit of drawing 3 , in order to perform an analog gradation display, it is necessary to impress the electrical potential difference near a threshold electrical potential difference (Vth) to the gate source inter-electrode of a transistor 107. However, if variation as shown in drawing 4 is in the gate voltage and the source current property of a transistor 107 For example, since the currents which flow to a transistor 107 differ like IA (intersection of the curve and VA which are shown as a continuous line), and IB (intersection of the curve and VA which are shown with a broken line) when gate voltage VA is impressed to the gate electrode of the transistor 107 of drawing 3 , The current which flows to EL element 106 will also change, the brightness of the field which must be the same brightness properly speaking will differ, and image quality degradation of brightness nonuniformity etc. will arise.
[0010] Moreover, as an area gradation method, the method proposed by reference "AM-LCD2000, AM 3-1" is held. This method divides one pixel into two or more sub-picture elements, and takes out the gradation of the pixel concerned with the gross area of the sub-picture element which turns on and off and turns on each sub-picture element. However, by this method, since it is difficult to gather a numerical aperture, about the actuation current density to a light emitting device, a raising colander is not obtained but there are problems, such as lifting of driver voltage and life lowering of a component.
[0011] Moreover, a time amount gradation method is a method which modulates the luminescence time amount of a light emitting device, and takes out gradation in order to solve the trouble in an above-mentioned analog gradation method and an above-mentioned area gradation method, for example, is SID2000. DIGEST It is reported by 36.1 (p. 912-915).
[0012] However, also in the method concerned, in order to make small effect of the variation in the transistor used for circuitry, it is necessary to operate the transistor for constant current actuation of a light emitting device in a linearity field, and, for this reason, there is a problem of lifting of supply voltage and power consumption.
[0013] Moreover, in order to change a video signal (it is one screen at the 1 field or one frame) into a time amount gradation display, a frame memory and MPU for memory input/output control will be needed, a system will become complicated, and cost will also be raised.
[0014] In order to solve these problems, some circuits which amend the dispersion of TFT itself are also proposed.
[0015] The pixel circuit which amends the threshold electrical potential difference (Vth) of the drive TFT which controls the current to an EL element using four TFT(s) and two capacitors for SID98 and the lecture number 4.2, and its actuation sequence are proposed. This amends Vth dispersion of Drive TFT by connecting the capacitor for an electrical-potential-difference clamp to a serial between the drain electrode of Addressing TFT, and the gate electrode of Drive TFT, and driving to predetermined timing. In order that the voltage level amended by the gate capacity factor of a clamp capacitor and Drive TFT may determine this circuit, big clamp capacity value is needed and it has a possibility of causing buildup of pixel circuit area.
[0016] On the other hand, IDRC (International Display Research Conference)2000, Digest The gestalt which applied current Miller circuit to the actuation circuit of the display which used the EL element is proposed by p.358-361. drawing in which drawing 5 shows the 1-pixel configuration of the actuation circuit concerned -- it is -- the inside of drawing, and 120 -- current Miller circuit, and 121-124 -- for an

organic EL device and 127, as for a signal line and 129, the scanning line and 128 are [TFT and 125 / retention volume and 126 / a power-source line and 130] current regulator circuits.
[0017] In the configuration of drawing 5 , by the selection signal impressed to the scanning line 127, if transistors 123 and 124 turn on, the constant current from a current regulator circuit 130 will be supplied to a transistor 121 through a transistor 124, and will be further supplied to the gate electrode of retention volume 125 and TFT122 through TFT123. TFT121 and TFT122 constitute the current mirror, and the same current flows. Since the gate electrode potential of TFT122 is being fixed by retention volume 125 even if TFT123 and TFT124 turn off, TFT122 holds an ON state and continues passing constant current. An organic EL device 126 will perform luminescence and nonluminescent one by controlling a constant current value by this condition.
[0018] Since it is not concerned with the threshold electrical potential difference of TFT but current Miller circuit 120 can supply the supplied current to a load, it becomes possible [supplying constant current to a load 126, i.e., an organic EL device,] regardless of the variation in TFT intrinsically. Moreover, the retention volume 125 used here is good in necessary minimum magnitude, in order to hold the gate voltage of drive TFT122.
[0019]
[Problem(s) to be Solved by the Invention] However, there were the following troubles in the above-mentioned conventional current Miller circuit.
[0020] The circuitry of the display panel of the active-matrix mold constituted by using the current Miller circuit of drawing 5 for drawing 6 and drawing 7 is shown. Among drawing, a light emitting device and 2 are control circuits, and one is current Miller circuit in this Fig. As for the scanning line and 7, the data driver circuit where a current regulator circuit and 4 control a scanning circuit, and, as for 5, 3 controls the output-level timing of a current regulator circuit 3, and 6 are [a signal line and 8] power-source lines.
[0021] Conventionally, as it connected every signal line 7 which constitutes a matrix like the current regulator circuit 3 shown in drawing 6 or was shown in drawing 7 , the current regulator circuit 130 of drawing 5 was connected so that all pixels might be driven in one circuit.
[0022] What is necessary is to be able to supply only the current which can drive 1 pixel fundamentally as actuation capacity of this circuit like drawing 6 , when a current regulator circuit 3 is connected every signal line 7.
[0023] However, with the configuration of drawing 6 , the current regulator circuit 3 which has the output capacity only for several horizontal picture element minutes is needed, for example, in the case of a VGA color, a 640x3=1920 piece circuit is needed. If it says simply, IC mounting of 1920Pin must be performed. Although it is also possible to produce on the same substrate as a picture element part in recent years using the polycrystalline silicon TFT substrate used as a substrate of high performance TFT, polycrystalline silicon TFT has the large variation in a property, and when it is going to constitute an analog-circuit like a current regulator circuit, it can understand easily the difficulty of varying and making the current regulator circuit of above a large number that there is nothing.
[0024] On the other hand, like drawing 7 , when driving all pixels in one current regulator circuit, there is concern to which component sizes, such as a transistor which the current actuation capacity that all the pixels connected to the 1 scanning line can be driven is needed, therefore constitutes a circuit, increase. Although a trouble like [in the case of drawing 6] is solved with the configuration concerned, in order to realize a different intensity level for every pixel, a current value must be dramatically switched with high frequency (in for example, the case of a 60 VGA display 55MHz).
[0025] Furthermore, in the electrochromatic display using an organic EL device, the ingredient which emits light in R (red), G (green), and B (blue) color, respectively is arranged for every unit pixel, for example, and color display is performed by transmitting a video signal for every pixel and obtaining desired brightness.
[0026] however, R, present G, and present B -- the luminescence brightness properties over the current density which pours each luminescent material for a component, i.e., luminous efficiency, differ for every ingredient. This property is qualitatively shown in drawing 8 . As shown in drawing 8 , generally

the luminous efficiency of G luminescent material is high (luminescence brightness is high if current density is the same.). Or if it is the same luminescence brightness, it is good by the constant current consistency. Next it is B luminescent material and R luminescent material has the lowest luminous efficiency.

[0027] the above-mentioned equipment -- setting -- R, G, and B -- when making all organic EL devices emit light and performing a white display, it is necessary to take a white balance into consideration but, and when luminescence wavelength of each color is set to R (615nm), G (545nm), and B (450nm), to set each luminescence brightness ratio as 0.45:1:0.04 from a visibility property is desired, for example. However, the luminous efficiency of the present luminescent material had lowest R, and since the ratio of R, G, and B also differs from the visibility property, in order to obtain a good white balance, it was difficult to carry out with the configuration which had to modulate the current level supplied to a component for every luminescent color, and was shown in drawing 6 and drawing 7 .

[0028] The technical problem of this invention solves the above-mentioned trouble, solves problems, such as effect of the variation in the property of switching elements, such as a transistor, and buildup of component size, in the actuation circuit of the light emitting device using a current regulator circuit, is to offer the desired display panel in which a brightness display is possible and its desired actuation approach for every pixel, and is to offer the display panel which can be displayed full color, and its actuation approach by the still better white balance.

[0029]

[Means for Solving the Problem] The first of this invention, matrix arrangement of the scanning line of a multi-line and the signal line of two or more trains is carried out on a substrate. A display pixel is formed by at least two or more unit pixels which adjoin considering the intersection of this scanning line and a signal line as a unit pixel. It is the display panel of the active-matrix mold equipped with the current control mold light emitting device from which brightness changes according to the current which flows for a component for every unit pixel. Each unit pixel It has the 1st thru/or the 4th transistor, retention volume, and the above-mentioned light emitting device at least. The gate electrode of the 1st transistor is connected to the scanning line in common for every unit pixel line. The 1st main electrode is connected to a signal line in common for every unit pixel train. The 2nd main electrode The 1st main electrode of the 2nd transistor, Connect with a gate electrode and the 1st main electrode of the 3rd transistor, and the 2nd main electrode of the 2nd transistor is connected to the 1st power-source line. The gate electrode of the 3rd transistor is connected to the scanning line in common for every unit pixel line. The 2nd main electrode is connected to the 1st electrode of retention volume, and the gate electrode of the 4th transistor. The 2nd electrode of retention volume is connected to the 1st power-source line, and the 1st main electrode of the 4th transistor is connected to the 1st power-source line. The 2nd main electrode is connected to the 1st electrode of a light emitting device, and the 2nd electrode of a light emitting device is connected to the 2nd power-source line. A signal line is connected to the current regulator circuit prepared for this every display pixel train in common for every display pixel train. The die length (L) of the gate electrode of a transistor and the rate of the ratio (W/L) of width of face (W) in the 2nd transistor and the 4th transistor are characterized by differing for every unit pixel in a display pixel.

[0030] In the display panel of above-mentioned this invention, the following configuration is included as a desirable mode.

[0031] The above-mentioned transistor is a thin film transistor.

[0032] The 2nd main electrode of the 4th transistor of the above is connected to the 1st electrode of a light emitting device through the switching means.

[0033] The above-mentioned switching means consists of multiplexers of 2 inputs.

[0034] The above-mentioned switching means comes to connect the 5th transistor and the 6th transistor with a serial, the 1st main electrode of the 5th transistor is connected to the 2nd main electrode of said 4th transistor, the 2nd main electrode of the 6th transistor is connected to the 1st electrode of a light emitting device, and it comes to constitute the multiplexer which considers the gate electrode of both transistors as two inputs.

[0035] The above-mentioned switching means consists of the 5th transistor, the 1st main electrode is connected to the 2nd main electrode of said 4th transistor, the 2nd main electrode is connected to the 1st electrode of a light emitting device, and the multiplexer which considers the gate electrode of the transistor concerned and the 2nd electrode of a light emitting device as two inputs is constituted.
[0036] The second of this invention is the actuation approach of the display panel of above-mentioned this invention, and impresses a selection signal to a sequential-scanning line for every display pixel line. Turn on the 1st thru/or the 3rd transistor of the unit pixel in the selected display pixel line, and it synchronizes with the "on" period of the 1st transistor of the above. The driving signal which has luminescence and nonluminescent information on the light emitting device of the unit pixel concerned is impressed to retention volume through the 1st and 3rd transistors from each signal line. It is characterized by turning on the 4th transistor according to the information on this driving signal, and supplying a current to a light emitting device through this 4th transistor from the 1st power-source line.
[0037] In the actuation approach of the display panel of this invention, the following configuration is included as a desirable mode.
[0038] It has a switching means between the 4th transistor and a light emitting device, and controls by supply of the current from the 4th transistor to a light emitting device, and turning on and off of this switching means.
[0039] By modulating the "on" period of the above-mentioned switching means, the luminescence time amount of a light emitting device is modulated.
[0040] The above-mentioned switching means consists of multiplexers of 2 inputs, and controls the modulation of the "on" period of this switching means by the input signal of the above-mentioned multiplexer.
[0041] It comes to connect a transistor with a two-piece serial, and the above-mentioned switching means considers the gate electrode of both transistors as two inputs, and carries out multiplexer actuation.
[0042] The above-mentioned switching means consists of one transistor, by considering the near electrode by which this transistor of a light emitting device is not connected with the gate electrode of this transistor as two inputs, multiplexer actuation is carried out and the luminescence time amount of a light emitting device is modulated.
[0043]
[Embodiment of the Invention] In drawing 8 , the inclination of luminescence brightness change of each color to current density is almost equal. This means that all intensity levels can be expressed from a fixed current by changing current density at a predetermined rate for every pixel of R, G, and B. This invention is attained using this property.
[0044] The display panel of this invention is a display panel of the active-matrix mold which has arranged the scanning line of a multi-line, and the signal line of two or more trains in the shape of a matrix on a substrate as a basic configuration, formed the display pixel by at least two or more unit pixels which adjoin considering the intersection as a unit pixel, and has arranged the light emitting device for every unit pixel.
[0045] In this invention, each unit pixel has the current Miller circuit shown in drawing 5 as a basic configuration. Namely, it has the 1st thru/or the 4th transistor, retention volume, and the above-mentioned light emitting device at least. The gate electrode of the 1st transistor is connected to the scanning line in common for every unit pixel line. The 1st main electrode is connected to a signal line in common for every unit pixel train. The 2nd main electrode The 1st main electrode of the 2nd transistor, Connect with a gate electrode and the 1st main electrode of the 3rd transistor, and the 2nd main electrode of the 2nd transistor is connected to the 1st power-source line. The gate electrode of the 3rd transistor is connected to the scanning line in common for every pixel line. The 2nd main electrode is connected to the 1st electrode of retention volume, and the gate electrode of the 4th transistor. The 2nd electrode of retention volume is connected to the 1st power-source line, the 1st main electrode of the 4th transistor is connected to the 1st power-source line, the 2nd main electrode is connected to the 1st electrode of a light emitting device, and the 2nd electrode of a light emitting device is connected to the

2nd power-source line. It has the configuration with which the signal line was furthermore connected to the current regulator circuit prepared for this every display pixel train in common for every display pixel train in the display panel of this invention as a basic configuration.

[0046] In this invention, the die length (L) of the gate electrode of a transistor and the rate of the ratio (W/L) of width of face (W) in the 2nd transistor and the 4th transistor are characterized by differing for every unit pixel in a display pixel further again. In this invention, as described above by setting up the rate of (W/L) of this 2nd transistor and the 4th transistor so that it may differ for every unit pixel, since the constant current supplied to each unit pixel flows to a light emitting device with current density which is different by the above and each unit pixel, different luminescence brightness for every unit pixel is obtained. That is, in case 3 unit pixel corresponding to each luminescent color of R, G, and B is made into a display pixel and indicates by full color by the lot, in the display pixel concerned, a good white balance is obtained by setting up the rate of (W/L) of the 2nd transistor of the above of each unit pixel, and the 4th transistor according to the luminescence brightness of each luminescent color.

[0047] The active-matrix circuit of the display panel of this invention is typically shown in drawing 1 . The light emitting device, 2R and 2G, and 2B to which 1R, 1G, and 1B emit light in R, G, and B, respectively are a control circuit which controls the current supplied to the light emitting devices 1R, 1G, and 1B of each luminescent color among drawing. As for the scanning line and 7, the data driver circuit where a current regulator circuit and 4 control a scanning circuit, and, as for 5, 3 controls the output-level timing of a current regulator circuit 3, and 6 are [a signal line and 8] power-source lines.

[0048] With the configuration of drawing 1 , the unit pixel of R, G, and B which constitute 1 display pixel in a line writing direction (direction which met the scanning line 6) is arranged, and the signal line 7 connects with the same current regulator circuit 3. In the configuration concerned, sequential selection of the scanning line 6 is made by the scanning circuit 4, synchronizing with this, the driving signal which has luminescence and nonluminescent information on each display pixel in a current regulator circuit 3 is impressed, and constant current is supplied to a signal line 7 from the data driver circuit 5 from the current regulator circuit 3 connected to the display pixel which emits light. This constant current is supplied to the control circuits 2R and 2G of the unit pixel which emits light, and 2B from a signal line 7, and, thereby, the current supply source to light emitting devices 1R, 1G, and 1B is performed to them in control circuits 2R and 2G and 2B.

[0049] The circuit diagram of 1 unit pixel of 1 desirable operation gestalt of this invention is shown in drawing 2 . This operation gestalt adds a switching means to the current Miller circuit shown in drawing 5 which is the basic configuration of this invention, and is a gestalt using [using an organic EL device as a light emitting device in a basic configuration / using the 5th transistor as the above-mentioned switching means] TFT as the 1st - the 5th transistor further. Among drawing, as for TFT and 26, an organic EL device and 30 are - power-source lines, and retention volume and 27 gave [the control circuit where two are equivalent to 2R and 2G of drawing 1 , and 2B and 21-25 / + power-source line and 28 / a pulse signal line and 29] the same sign to the same member as drawing 1 R> 1.

[0050] In the circuit of drawing 2 , if the scanning line 6 is chosen and TFT 21 and 23 turns on, when the unit pixel concerned will emit light, as a driving signal, constant current is supplied to TFT22 by the signal line 7 through TFT21, and is further inputted into the gate electrode of retention volume 26 and TFT24 through TFT23 from a current regulator circuit 3. TFT22 and TFT24 -- a current mirror -- constituting -- **** -- the (W/L) -- the current according to a rate flows. Since the gate electrode potential of TFT24 is being fixed by the signal by which memory was carried out to retention volume 26 even if TFT21 and TFT23 turn off (memory is carried out), memory of the ON state of TFT24 by this driving signal is carried out, and constant current is supplied to an organic EL device 29 from + power-source line 27. In this operation gestalt, only the period when TFT25 turned on the constant current supplied through TFT24 with the ON signal eventually inputted from the pulse signal line 28 is supplied to an organic EL device 29 through this TFT25. That is, time amount gradation can be obtained by control of the "on" period of TFT25 by having formed TFT25.

[0051] Since it is set up for every unit pixel in this invention so that a white balance with the mirror ratio optimal at R, G, and B in the rate, i.e., the current Miller circuit, of (W/L) of TFT22 and TFT24 may be

maintained as described above, the current value from common + power-source line 27 is controlled for every unit pixel, and good gray (gradation) can be displayed. Therefore, in performing a monochrome gradation display, after turning on TFT25 of each unit pixel simultaneously within a display pixel, this "on" period is modulated, and it controls the luminescence time amount of an organic EL device 29. Moreover, what is necessary is to modulate the "on" period of TFT25 for every unit pixel, and just to control the luminescence time amount of an organic EL device 29 for every unit pixel, in performing a color gradation display.

[0052] Moreover, in this operation gestalt, the pulse signal line 28 is connected in common for every unit pixel line. Connect the cathode electrode of an organic EL device 29 in common for every unit pixel train, carry out matrix wiring, and by carrying out multiplexer actuation by considering the pulse signal line 28 and a cathode electrode as two inputs The luminescence time amount of an organic EL device 29 is controllable for every unit pixel (control of the time amount from which ON and the cathode electrode potential of an organic EL device 29 are set to low level by TFT25).

[0053] Drawing 9 shows the 1-pixel circuit diagram of other operation gestalten of the display panel of this invention. As for 91 and 92, TFT, and 93 and 94 are pulse signal lines among drawing. This operation gestalt is replaced with TFT25 as a switching means in a previous operation gestalt, is a gestalt which constituted the switching means from a multiplexer of 2 inputs, specifically connects the 5th transistor and the 6th transistor to a serial, considers each gate electrode as two inputs, and carries out multiplexer actuation. That is, the control driver used for multiplexer actuation by the conventional liquid crystal display panel etc. can be used, a control signal can be inputted into the pulse signal lines 93 and 94, turning on and off of TFT 91 and 92 can be controlled by the combination, and the period (period which TFT 91 and 92 turns on simultaneously) which supplies a current to an organic EL device 29 for every unit pixel can be controlled.

[0054] In this invention, since the so-called current Miller circuit is used for the circuit of each unit pixel, the analog gradation control which is not influenced by the variation in the TFT property which constitutes a circuit is possible.

[0055] moreover, since each display pixel supplies constant current from the same current regulator circuit, with the configuration of the unit pixel which constitutes a display pixel fundamentally, for example, drawing 1 , as for a circuit-load, this current regulator circuit 3 is markedly boiled compared with the case where all unit pixels are driven, and the current actuation capacity that three unit pixels can be driven can make it small what is necessary be just to be in one current regulator circuit 3.

[0056] Moreover, since 3 unit pixel of R, G, and B is driven with the current from the current regulator circuit 3 common as one display pixel, Even when the unit pixel which constitutes a display pixel like the configuration of drawing 1 has arranged to the line writing direction and it mounts the external constant current source IC temporarily, a connection Pin number can be managed with one third to the case of the conventional number of 1-/unit pixels, for example, drawing 1 , and can attain raise in the yield, and low cost-ization. Therefore, as an array direction of the unit pixel which constitutes a display pixel from this invention, a line writing direction is desirable.

[0057] Moreover, the current value for every unit pixel of R, G, and B which are driven in one current regulator circuit 3 By controlling by mirror ratio of current Miller circuit, the connection between a current regulator circuit 3 and a control circuit 2 It can be considered the configuration of conventional drawing 6 the same way, there is no need of switching the output of a current regulator circuit 3 with high frequency dramatically, like [when driving all pixels in one current regulator circuit 3 like before] (what is necessary is just to change the selection period of the 1 scanning line), and a low power is planned as a result.

[0058] Moreover, in the above-mentioned operation gestalt, although a display pixel shall be constituted from a unit pixel of three colors of R, G, and B Especially this invention is good also as a square array, when it is not limited to this, a display pixel may be constituted from a 4 unit pixel of R, G, B, and W (white) and it constitutes [and] a display pixel from a 4 unit pixel as the array approach. Furthermore, a still larger tonal range can also be displayed by constituting a display pixel from same color combining the unit pixel which changed mirror ratio. In addition, when the unit pixel which constitutes a display

pixel straddles two or more lines, it is necessary to choose the corresponding scanning line simultaneously.

[0059] In addition, in the above-mentioned operation gestalt, although the case where used TFT as a transistor and an organic EL device was used as a light emitting device was explained to the example, transistors other than TFT can also be used. Moreover, as a switching means, the transistors and active components other than TFT may be used, and an inorganic EL element and an LED component can be preferably used as a light emitting device.

[0060]

[Effect of the Invention] According to this invention, as explained above, in the display panel of the active-matrix mold using the light emitting device of a current control mold, better gradation display and color display are realized more with a low power, and further, the manufacture yield improves by circuitry being simplified and it becomes possible to provide more cheaply.

[Translation done.]

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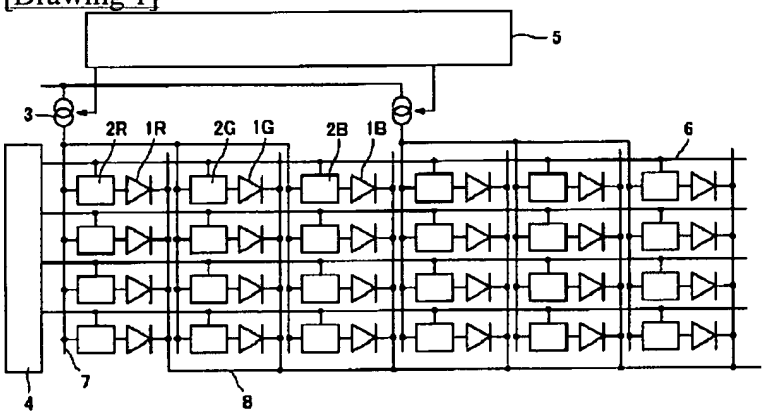
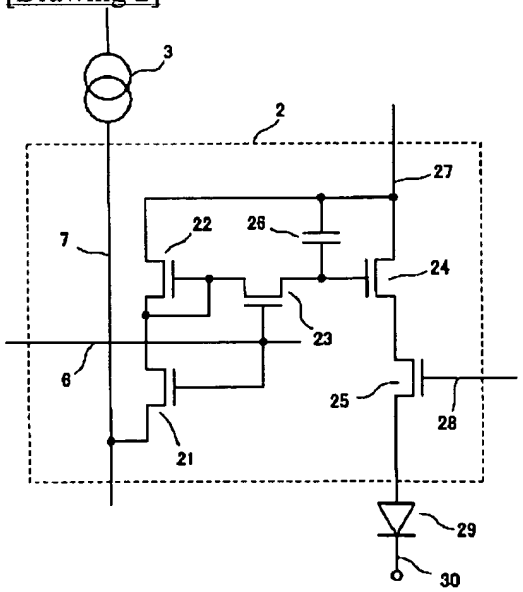
DRAWINGS

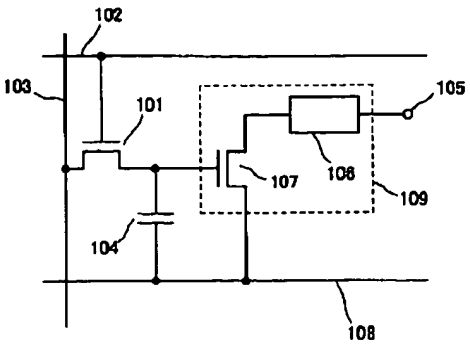
[Drawing 1]



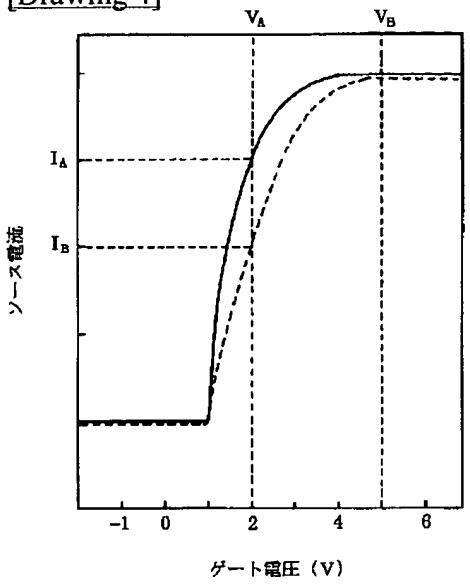
[Drawing 2]



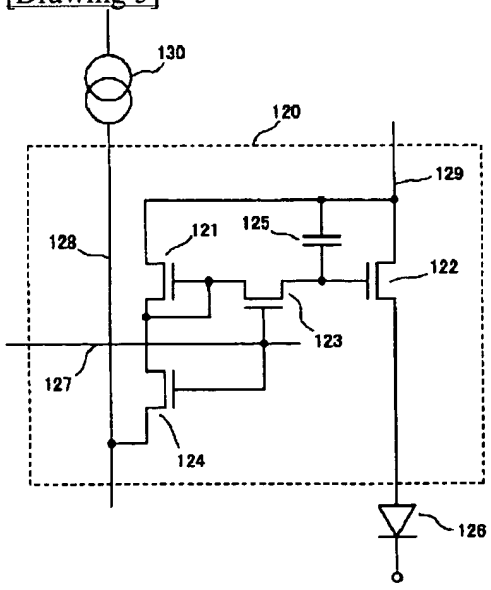
[Drawing 3]



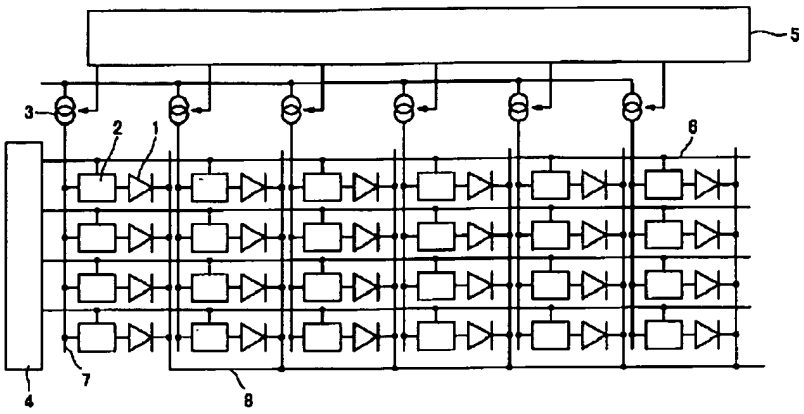
[Drawing 4]



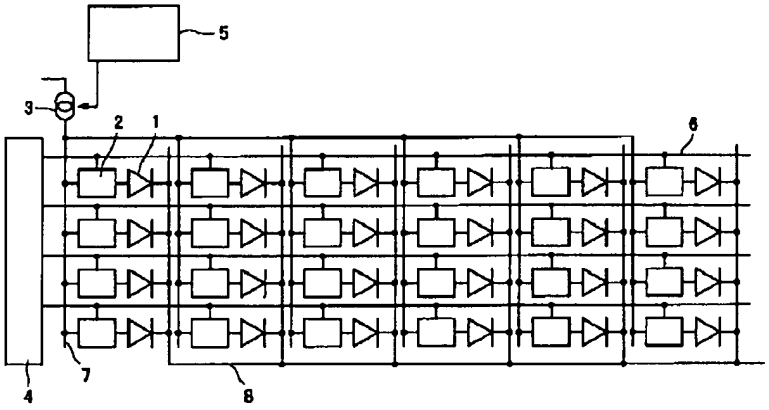
[Drawing 5]



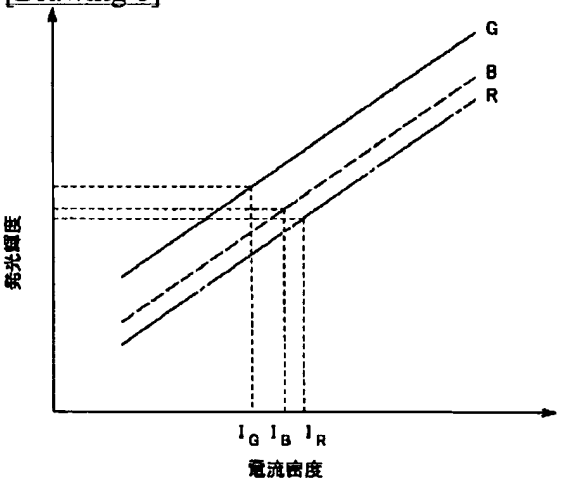
[Drawing 6]



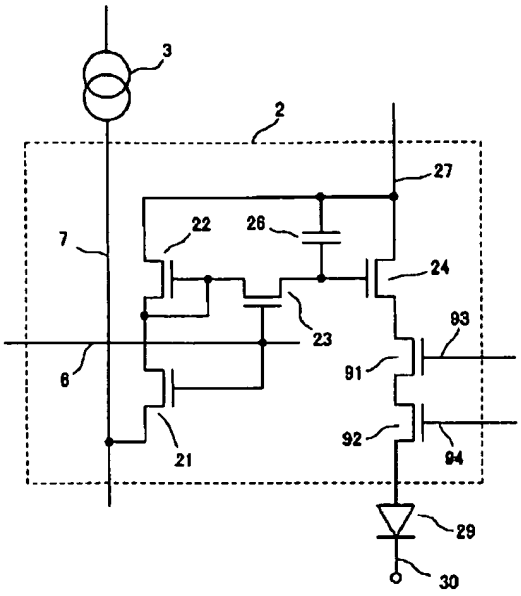
[Drawing 7]



[Drawing 8]



[Drawing 9]



[Translation done.]